Post Meeting notes

ARUP/JA 800' progress status meeting, Thursday July 8 at 1PT/2MT/3CT (Fermilab)/4ET.

Agenda

LBNE project status update - 10 min. - Fermilab

Cavern and access drift layout / Excavation – 20 min. - Jacobs & Associates

VETO counter current thoughts – 10 min. - Jacobs & Associates

Cryostat and cryogenic plant – 20 min. – ARUP

General Discussion - FNAL, DUSEL, JA, ARUP

Reminder: August 9th is tentative Close out meeting, final report issued that week.

Cavern and access drift layout / Excavation - Greg Colzani, Jacobs and Associates

Presentation has raised bore shafts starting in the existing 300' drifts, going down to the 800' level. This means the raised bore shafts only need to be 500' deep. It saves cost. The piping and utilities enter from the Kirk portal location and run about 300' to 400' in the 300' drift and then go down the shafts to the cavern location. This also puts the utilities tie in location and surface cryogenic receipt/delivery facility at the Kirk portal area which is accessible by vehicles. This is preferred over locating it on the steep mountainside (new roads required) if the shafts ran all the way to the surface. It also reduces the required pressure rating of cryogen piping since the liquid column height is 500' instead of 800'.

It was agreed that it would be better to drive a new 300' drift rather than utilizing the existing 300' Kirk portal drift. There is a CO2 experiment that will use the existing 300' drift. Also ventilation plan has fresh air coming in the drive in 800' ramp and expelling up the shafts to 300' and out. Even though any tie in to the DUSEL facility at 300' and 800' would have double door bulkheads, it is better that the ventilation path isn't shared with the existing 300' drift. Having a new 300' drift gives flexibility to locate the vertical piping and utility shafts anywhere we need them. The entrance to this new drift will be advantageously located similar to the existing Jacobs & Associates report for LAr20 at 300'. The size of the drift would be 4m x 4m clear (5 m to crown). A small bridge is needed to go across the creek at 300' area.

It was agreed that a piping utility shaft would be located over the end of the LAr cavern space, opposite the upper level entrance to the cavern. The presentation showed the shaft over a sump at the lower level access way. The shaft diameters will be 1-2 m size. ARUP is to determine what cross section shaft is needed. It is noted that physical inspection and repair would not be possible in a shaft that size.

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Waste rock removal was assumed to occur by hand off to DUSEL at the 300' Kirk portal area. That assumption is not realistic. It is estimated that 200,000 m^3 of (banked/expanded) rock will need to come out for one liquid argon cavern. Trucking the rock out is a very expensive option compared to other means. Truck traffic through town is also objectionable. Some work needs to be done to consider how the waste rock is handled. After the meeting, Tracy Lundin (Hansen Inc.) and Elaine McCluskey (FNAL/LBNE) generated two possible solutions. "One would be to construct a conveyor up the steep hill from the portal entrance at the road up to the Ross shaft to get the rock directly to the rock conveyance system that's being planned. The other would be to excavate the rock in the entrance tunnel to the existing Ross 800L drift, and find a temp stockpile location for that rock. Then work to create a way to dispose of the rock at the Ross shaft at the 800L, which likely means creating a way (via a drop shaft) to get it to the 2650L, where there's a means to get it back up the shaft. The originally excavated rock would have to come back in the mine to be disposed in this new manner." These ideas along with others will need to be developed and cost estimated.

Cryostat and cryogenic plant – Andrew Grime, ARUP

The concept that the cryostat needs to be evacuated was discussed. A large impact of this requirement is the design of the roof truss. The roof truss gets significantly deeper and more costly. The concrete walls and floor slab design also is getting thicker with more steel reinforcement, rock Dywidag bolting translating into higher costs. It was asked whether the ARUP report should present the evacuable design or whether it was better to present a non-evacuable design similar to the previous reports along with statements demonstrating the feasibility of an evacuable design. The advantage of presenting the non-evacuable design is that the cost will be less. Considering that Fermilab does not feel that internal evacuation is a necessity, it was agreed that ARUP can proceed with a non-evacuable design with the option of evacuation shown to be feasible.

The TPC support rails are supported from above through penetrations in the roof of the LAr vessel. The support rods were shown on the ARUP drawings to tie into the drip shield or rock above. There is currently an idea that the support rods would go into some other self supporting structure or truss that spans across the roof. Russ Rucinski is to provide additional details and information to ARUP describing this. With regard to the VETO counter array, ARUP need only show the cavern profile correctly, using Jacobs and Associates drawing information.

A request was made by Anne Heavey that Jacobs Associates and ARUP provide drawings/graphics generated using vector graphics (high resolution) as a source. Figures and drawings that are part of their conceptual design reports will be used in our CDR. Please see the guidelines and additional information that follows.

Image and Figure Guidelines

Please adhere to the rules below to provide the highest quality images:

About image types

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1. There are two major types of graphics: vector and raster-based bitmaps. USE VECTOR ONLY EXCEPT FOR PHOTOS**!!**
2. Vector graphics are made up of many individual objects. They are resolution independent because they can be output to the highest quality at any scale.
3. Software used to create vector graphics is sometimes referred to as object-based editing software. Common vector formats for plots include ROOT (or PAW), gnuplot, Mathematica, octave, S/R, Matlab, etc. For drawings, AI (Adobe Illustrator), CDR (CorelDRAW), CGM (Computer Graphics Metafile), SWF (Shockwave Flash), and DXF (AutoCAD and other CAD software).
4. Vector graphics tend to have much smaller file sizes than raster-based bitmaps.
5. Bitmap-based images are comprised of pixels in a grid. Each pixel or "bit" in the image contains information about the color to be displayed.
6. Bitmap images have a fixed resolution and cannot be resized without losing image quality.
7. Bitmap file types include jpg, gif, tif, png and a few others.

What to do for the CDR

1. Please provide vector images saved as PDF or EPS files.
2. Exception: save photographic images (and only these) as JPG
3. When producing original drawings or plots, always save the results as vector image data in either PDF or PS/EPS directly from the application.
4. Caution: Using PDF and PS/EPS file formats does not imply the underlying image data are vectors.
5. If any photo-manipulation is required, avoid introducing high frequency elements (such as lines with gradient-free edges), save any intermediate results in the native application format and save the final results as JPEG.
6. Never convert a file from one format to another (the editors will do this if required). This is particularly important if you fail to produce native vector image data and are stuck with raster (aka bitmap). It is preferable to submit the original raster format than to *convert* it into PDF.